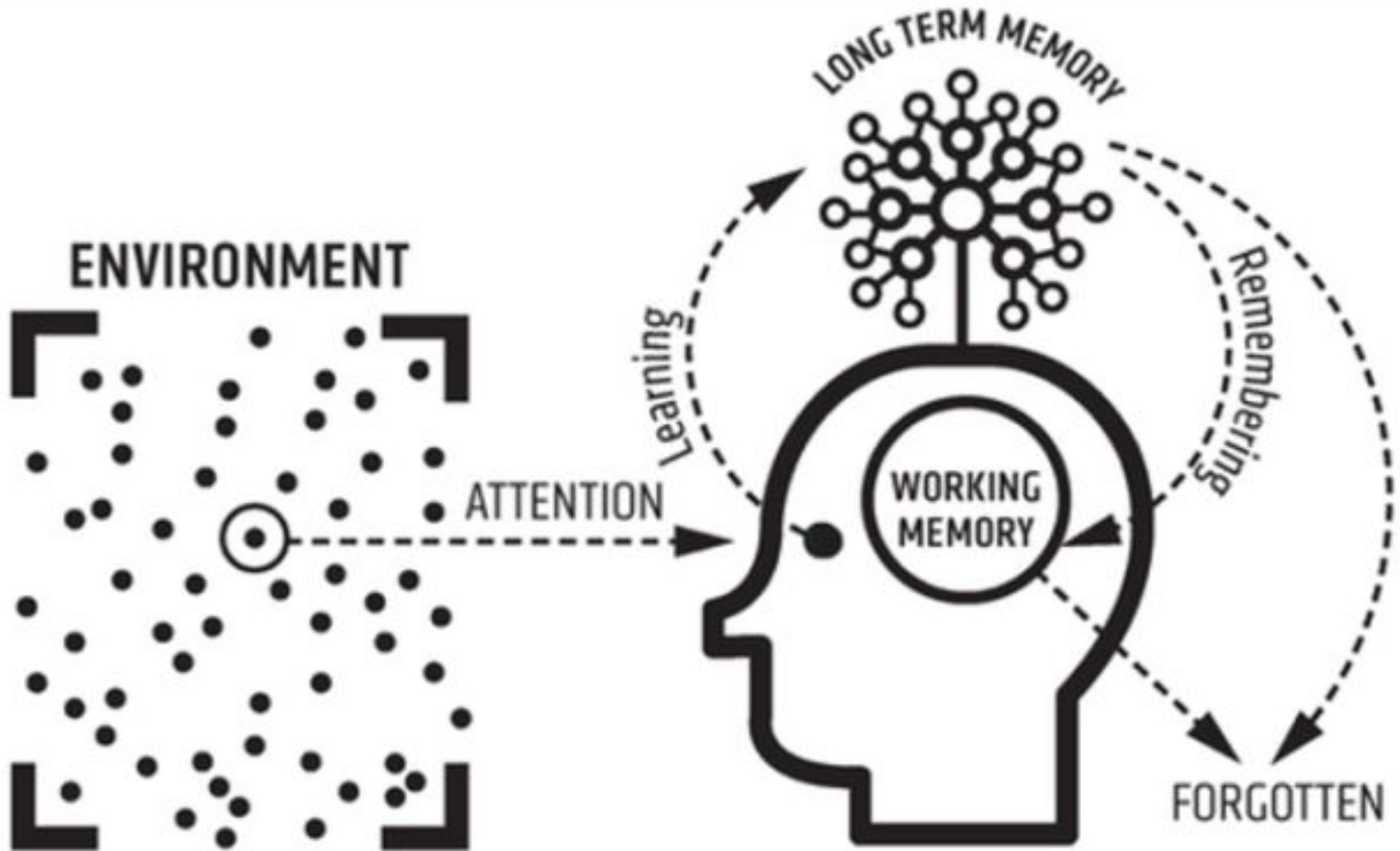




# Memory - an introduction for teachers

Chris Runeckles - Assistant Director of Durrington Research School



# Memory Myths

|   |   |  |
|---|---|--|
| <b>Myth 1:</b> <i>We only use 10% of our brain.</i>   | <b>Myth 2:</b> <i>We are more likely to remember something if we discover it for ourselves.</i> | <b>Myth 3:</b> <i>Men and women learn differently.</i> |
| <b>Myth 4:</b> <i>We learn better when teaching is tailored towards our preferred learning style.</i> | <b>Myth 5:</b> <i>Your brain is a muscle that can be trained.</i>                               |  |

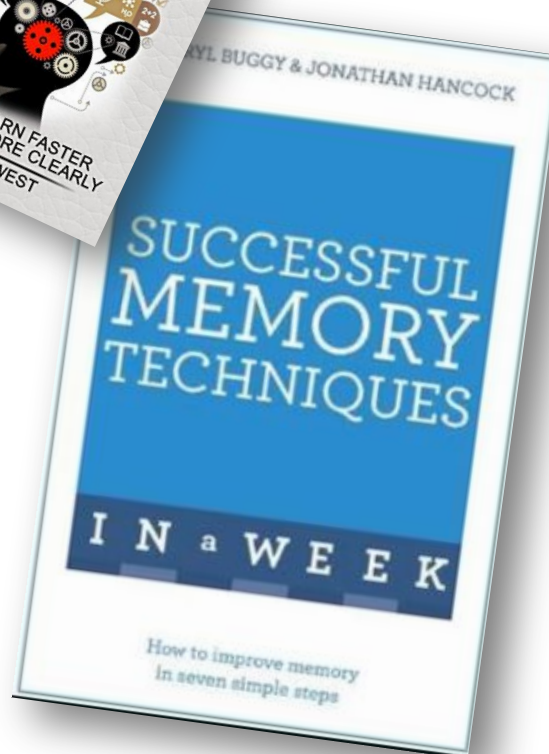
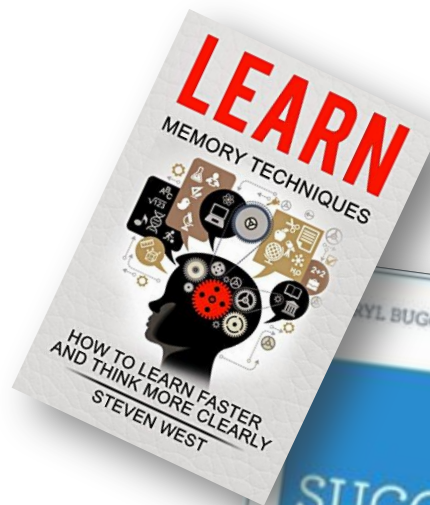
# Memory Myths

|  |   |   |
|--|---|---|
| <b>Myth 6:</b> <i>We do not need to remember facts now we have the internet.</i> | <b>Myth 7:</b> <i>Performance is always a sign of learning.</i> | <b>Myth 8:</b> <i>Rereading notes and highlighting are effective revision strategies.</i> |
| <b>Myth 9:</b> <i>We are good judges of how much we will remember.</i>           | <b>Myth 10:</b> <i>Forgetting is the enemy of memory.</i>       |   |

# Memory Myths

|   |  |  |
|---|--|--|
| <b>Myth 11:</b> <i>Memorable lessons should always contain unique and unexpected experiences.</i> | <b>Myth 12:</b> <i>Stories are only for English lessons.</i>       |  |
| <b>Myth 13:</b> <i>Learning is visible.</i>   | <b>Myth 14:</b> <i>Cramming is an effective revision strategy.</i> | <b>Myth 15:</b> <i>We can always trust our memory.</i> |

**BRAIN GYM**<sup>®</sup>  
International



# Can you remember...

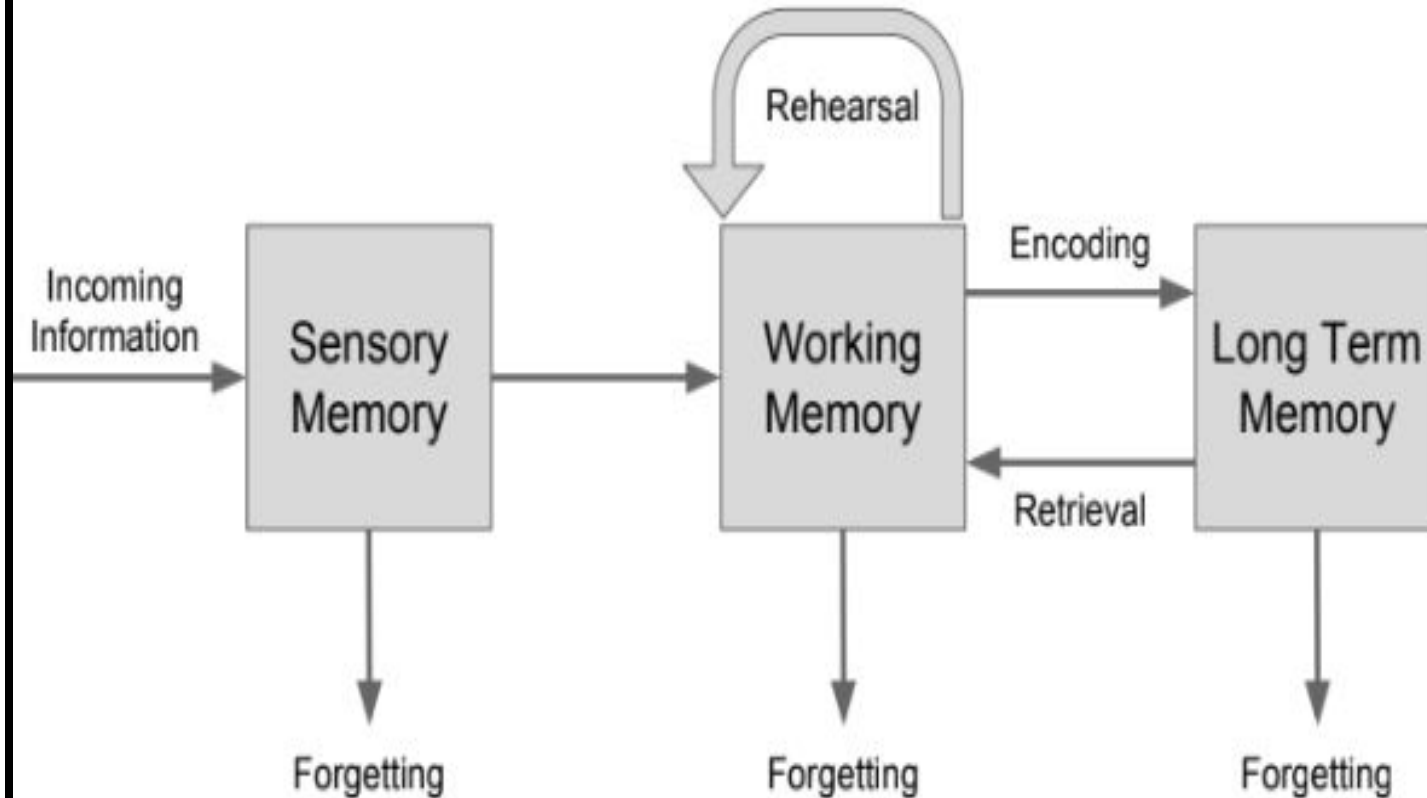
Your parents' phone number when you were growing up?

What you had for dinner last Thursday?

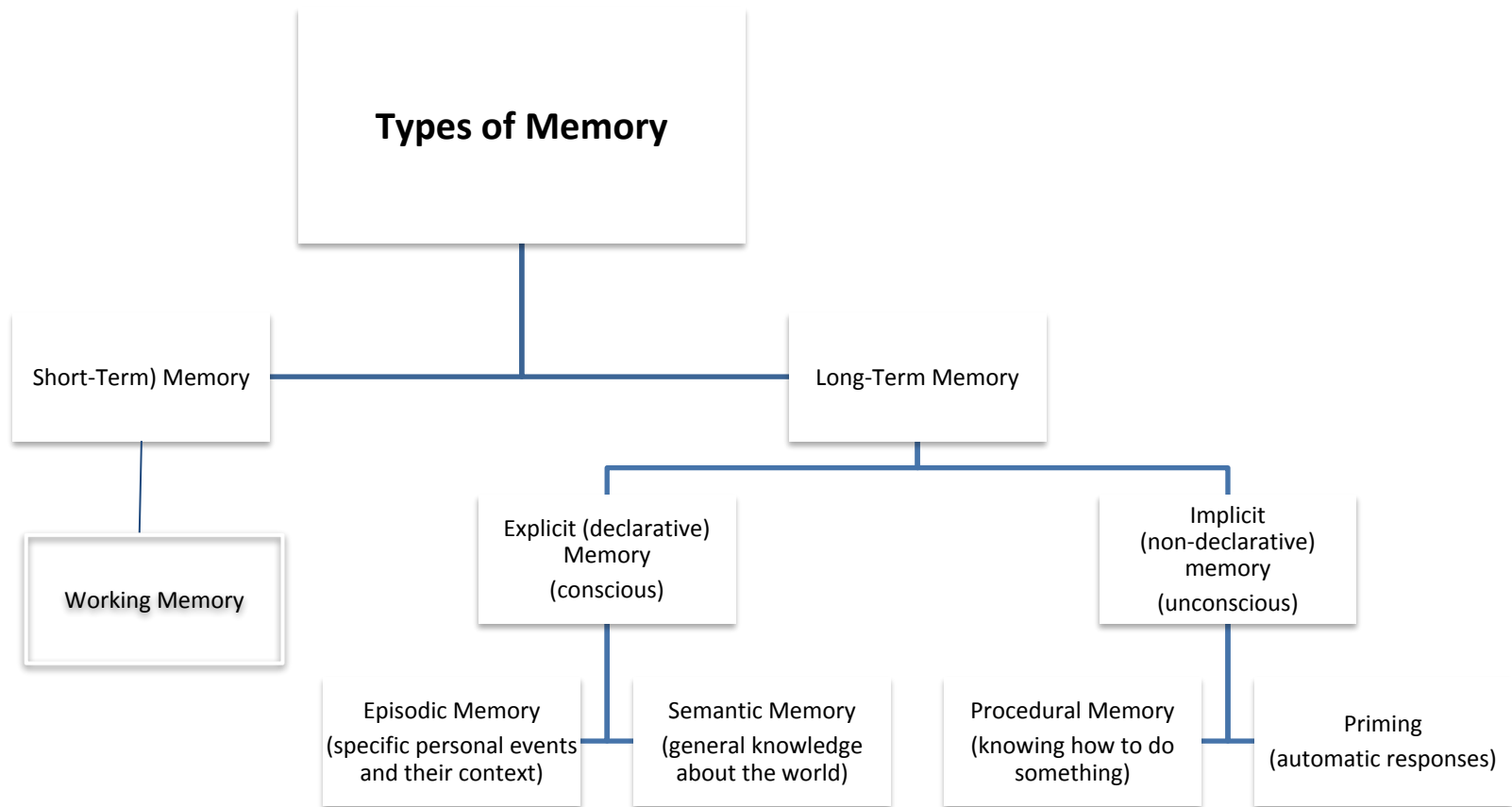
Your best friend's birthday?

The exact cost of the fuel the last time you filled your car up?

# Working Memory & Long Term Memory







***Edward Tulving's (1985) systems of memory***

# Long-term memory and working memory

**Long-term memory** - a huge storehouse of vocabulary, concepts and procedures

**Working memory** – the limited space in which we think and process information

# Long-term memory and working memory

## Working memory limitations:

- Almost all information is lost after 30 seconds.
- Limited to a small number of elements.
- Usually estimated at seven, but may be as low as four (plus or minus one).
- When processing information, may be as low as two or three items (depending on complexity).
- However, the long-term memory has a potentially limitless capacity (although it's hard to retrieve stuff).

# Try to remember these ...

BCB

VTI

NNC

SHN

# Now try it ...

BBC

ITV

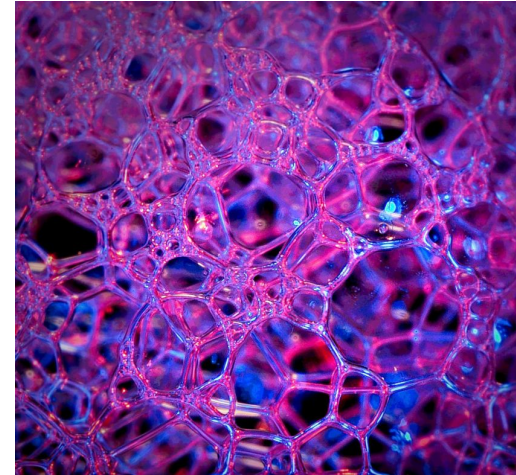
CNN

NHS

The difference?  
They were already  
chunked in your  
long-term memory.

# Schemas

- Long term memories are stored in schemas:
- They are a **cognitive heuristic** that helps us to organise our knowledge and experience.
- They contain more than factual details, they contain *sensory* and *emotional* information too.



# Schema



# Learning and schemas



- Learning is the process of **building and reshaping** schemas.
- Schemas develop through either:
  - **assimilation** (*new experiences are incorporated in an existing schema*) or -
  - **accommodation** (*the schema is changed /reorganised to fit the new experience*).
- **Retrieval practice** re-shapes, reorganises and strengthens existing schema.
- Schemas can lead to **stereotypes** and belief systems – ‘*I can’t do Maths*’, ‘*I’m rubbish at English*’, ‘*I must not fail*’.
- **Peripheral learning** is incorporated in to schemas which *may or may not* enhance the learning.





# Six Strategies for Effective Learning

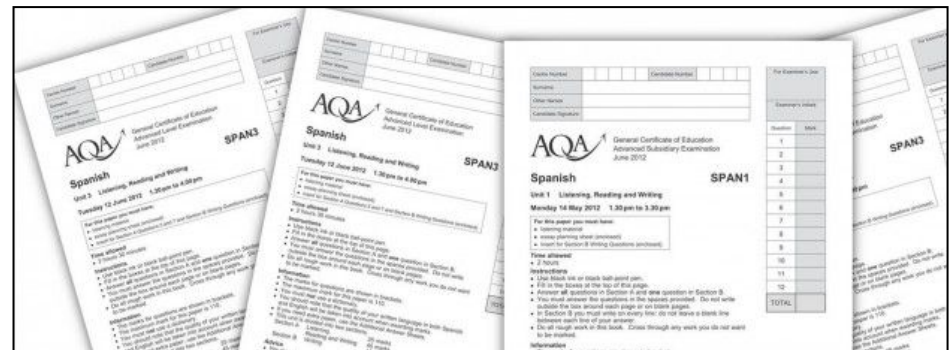
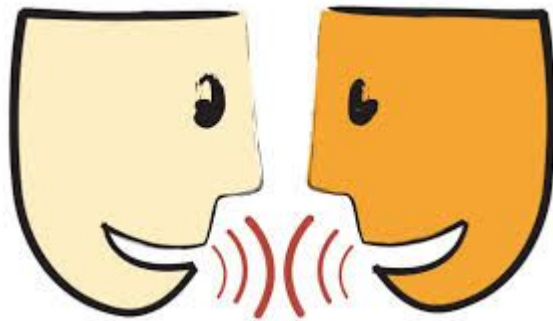
[www.learningscientists.org](http://www.learningscientists.org)

In this series, we provide information so students can learn how to study using..



All of these strategies have supporting evidence from cognitive psychology. For each strategy, we explain how to do it, some points to consider, and where to find more information.

# Retrieval Practice



# Retrieval Practice

## What this is:

- Retrieving something from memory (often with the help of a cue).
- Effort to retrieve information strengthens memory (desirable difficulty).

## What this isn't:

- Re-studying notes/revision guides.
- Asking students to retrieve something they have not already been taught!

# Retrieval Practice

## Teacher:

- Daily and weekly quizzes/retrieval tasks.



## Student:

- Flash cards.
- Mind-mapping from memory.
- Completing practice papers without notes.

# Distributed (spaced) Practice



# Distributed (spaced) Practice

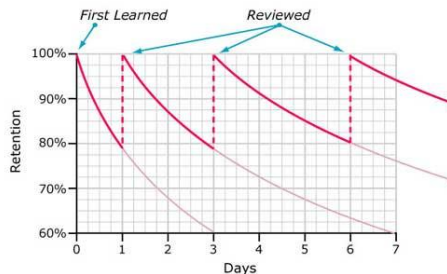
## What this is:

- Returning to topics previously studied with increasing gaps.
- Revision being chunked and spaced.

## What this isn't:

- Mixing topics up together.
- Returning to something done at the start of the lesson at the end of the lesson.

Typical Forgetting Curve for Newly Learned Information



# Distributed (spaced) Practice

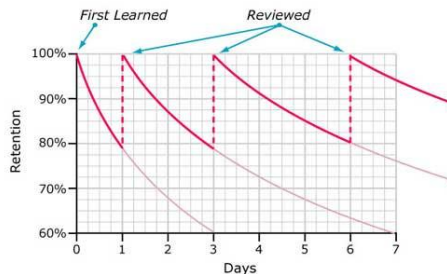
## Teacher:

- Pause lessons.
- Spacing built into curriculum planning.

## Student:

- Two hours study on Sunday becomes 30 minutes on Monday, Tuesday, Wednesday and Thursday.

Typical Forgetting Curve for Newly Learned Information





# Elaboration





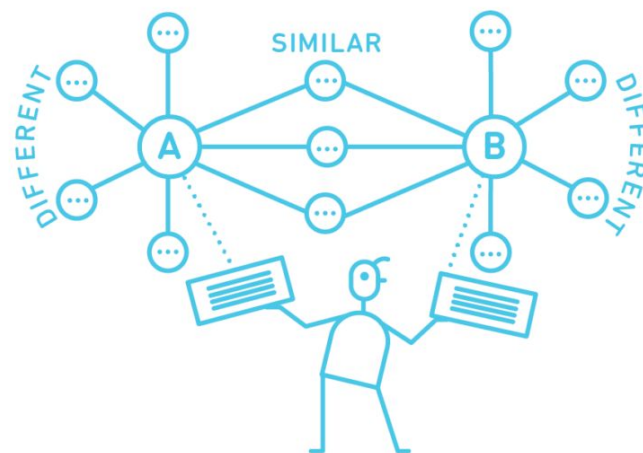
# Elaboration

## What this is:

- Deepening understanding through questioning.
- Interrogating answers.
- Making connections between ideas.

## What this isn't:

- Writing more.
- Students teaching themselves new knowledge.



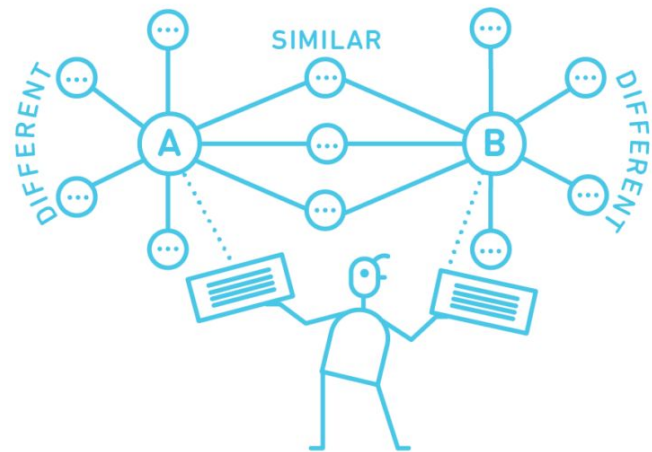
# Elaboration

## Teacher:

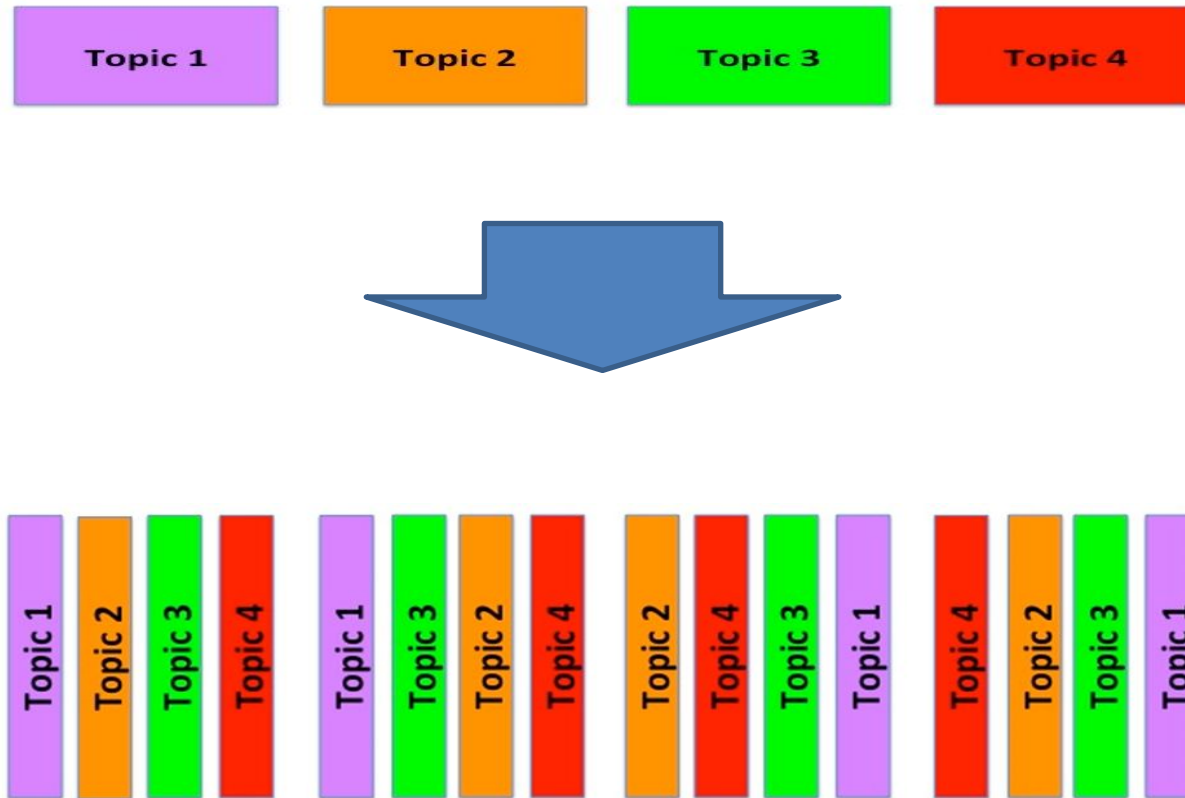
- Creating a knowledge organiser that connects the same piece of knowledge to several concepts.
- Targeting higher ability students with elaboration questions.

## Student:

- Creating a concept map.
- Asking “why is that answer right?” during a recall quiz.



# Interleaving



# Interleaving

## What this is:

- Studying/revising different topics in the same study session.



## What this isn't:

- Spacing.
- Moving on to new material before mastery.
- Something enjoyable or intuitive!

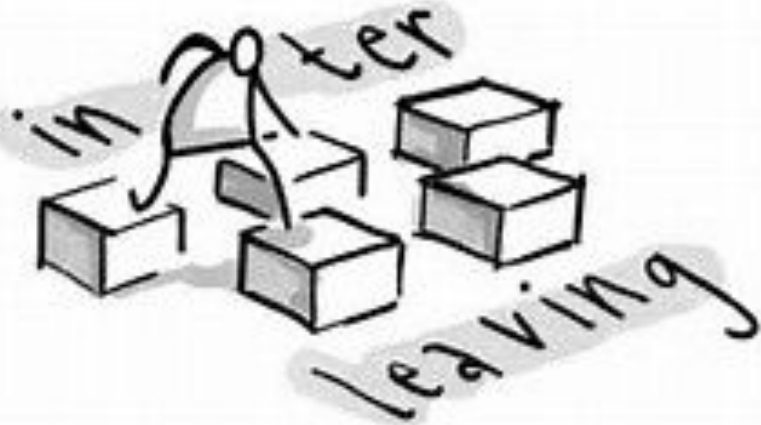
# Interleaving

## Teacher:

- Cumulative testing – e.g. mixing up questions from topics.

## Student:

- Mixing together flash cards from separate topics (or even subjects).



# Misconceptions about interleaving

- The interleaving research refers to single study sessions. There is no evidence to suggest that the whole curriculum should be interleaved.
- Students require some degree of mastery in the content before problems are interleaved.
- Poor understanding of interleaving can lead to confused schemes of work, confused teachers and confused students!
- Rule of thumb. Use it as a revision strategy, not a teaching strategy.
- It is not the same as spaced practice.

# Concrete examples



 alamy stock photo

B76WB1  
www.alamy.com

# Concrete examples

**What this is:**

**Finding specific examples to understand abstract ideas.**

**What this isn't:**

**Having to make up ideas to exemplify something.**



# Concrete examples

**Teacher:**

**Analogies**

**Explicit teaching of key examples**

**Student:**

**Identifying concrete examples when revising.**

# Describe the pomelo

# Describe the pomelo



# Dual Coding

## What this is:

- Combining words and visuals.
- Converting information into different formats.

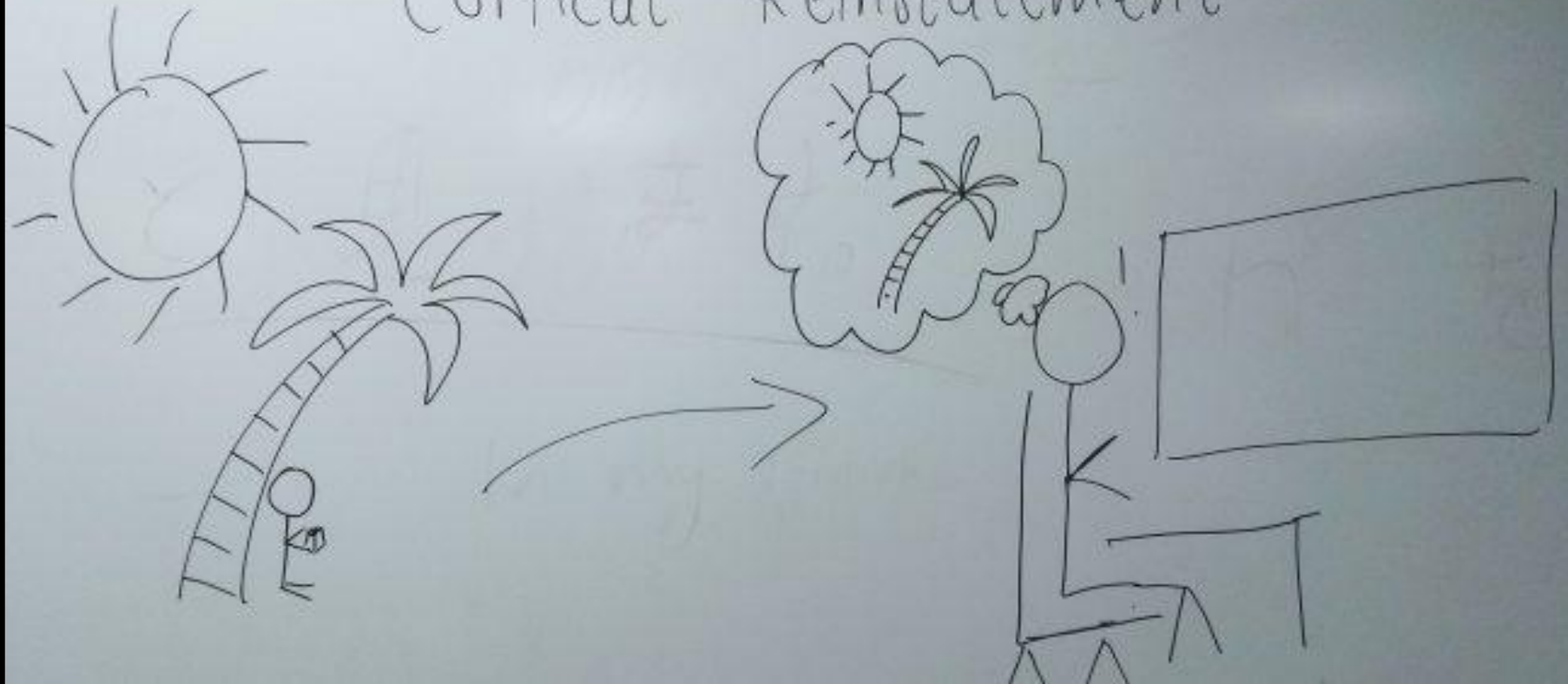
## What this isn't:

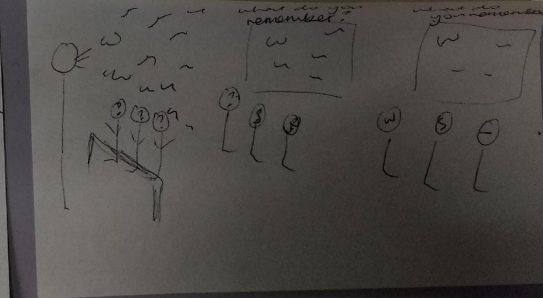
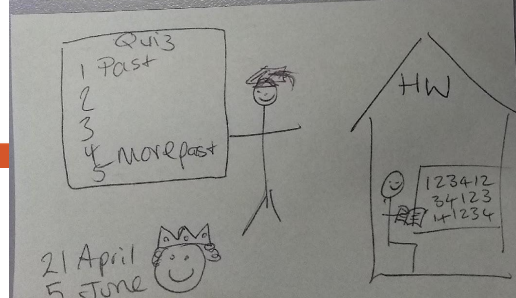
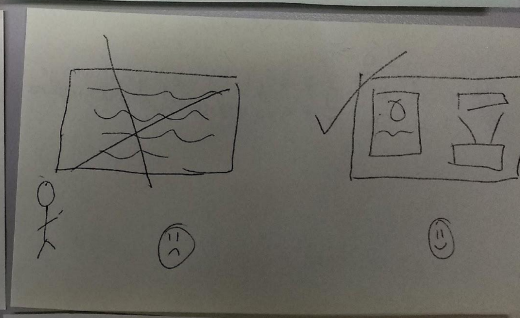
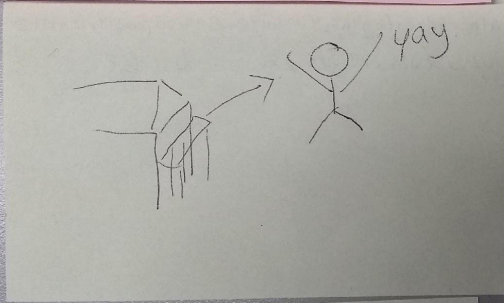
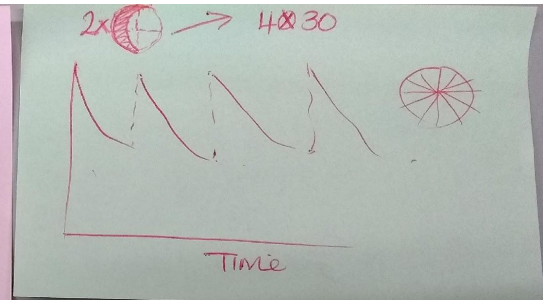
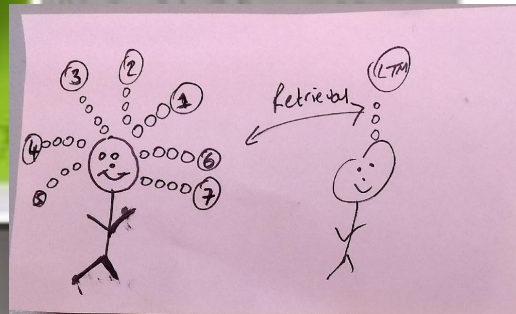
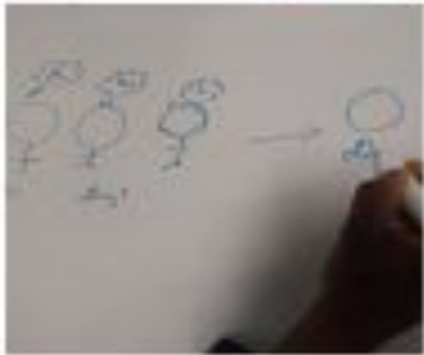
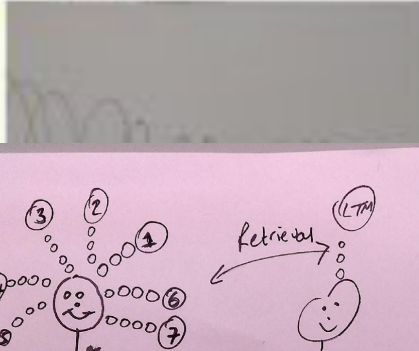
- Dependant on artistic skill.
- Limited to one style.

# Dual coding in the classroom

- When explaining a new idea verbally to the class, draw a simple diagram on the board at the same time you are explaining it
- When discussing a sequence of events, space the events out as notes on the board, bullet point and draw simple diagrams that relate to each section
- Use flow diagrams to explain key processes.
- Summarise key ideas as a diagram, whilst they are being taught.

# Cortical Reinstatement





# Reflection task

Consider the implications for your practice from this session:

- 1) The model of Memory
- 2) Retrieval Practice
- 3) Spaced Practice
- 4) Interleaving
- 5) Elaboration
- 6) Concrete Examples
- 7) Dual Coding

